[11-336581]

[Claim 1] A hybrid vehicle control device which is applied to a hybrid vehicle having two power sources of an internal combustion engine and an electric motor that are mutually connected and driven, stops the internal combustion engine when the vehicle is stopped, and starts the internal combustion engine by a rotating force of the electric motor when the vehicle is started, comprising:

torque fluctuation calculating means for calculating a torque fluctuation component generated in an output shaft of the internal combustion engine, and

electric motor torque control means for correcting a torque command value of the electric motor by adding, in opposite phase, the calculated torque fluctuation component to the torque command value.

[Claim 2] The hybrid vehicle control device according to claim 1, wherein the torque fluctuation calculating means calculates the torque fluctuation component generated in the output shaft of the internal combustion engine by approximating the torque fluctuation component, by a third order or lower component of sin function, to an order of the torque fluctuation caused by compression and expansion in the internal combustion engine.

[Claim 3] The hybrid vehicle control device according to claim 1 or 2, wherein the torque fluctuation calculating means calculates the torque fluctuation component generated in the output shaft of the internal combustion engine from a function with respect to a rotation angle of the output shaft.

[0022]

When a crank angle θ passes zero degrees (compression top dead center of #1 cylinder), a piston starts its compression stroke, and is forced downward by a pressure of air compressed within a combustion chamber, whereby the internal combustion engine torque becomes a positive value. Subsequently, a compression stroke of the next cylinder (#3 cylinder) starts, and intake air is compressed, whereby the internal combustion engine torque starts to decline. Then, the internal combustion engine torque becomes a negative value near $\theta = 90$ degrees, and reaches a bottom value near $\theta = 180$ degrees (compression top dead center of #3 cylinder). In the case of a four-cylinder internal combustion engine, a characteristic is such that torque fluctuation occurs two times per rotation of the engine output shaft (i.e. per 360 degrees).

[0040]

It should be noted that the invention may be achieved in the following embodiment in addition to the aforementioned embodiment. In the embodiment above, the torque fluctuation component generated in the engine output shaft is calculated using an approximate expression of the sin function. However, such configuration may be changed as follows. That is, the torque fluctuation component of the engine output shaft exhibits substantially the same characteristics if the engine rotation speed and the engine temperature are under a fixed condition in a motoring state. Therefore, characteristics of torque fluctuation in accordance with the crank angle, engine rotation speed, and engine temperature are stored in the ECU 11 in advance. Then, the torque fluctuation component is estimated according to crank angle information, temperature information, and the like of a given time, based on the characteristics stored in the ECU 11. In this case, as in the aforementioned embodiment, torque fluctuation generated in the engine output shaft is absorbed, thereby achieving smooth running by the electric motor 2.